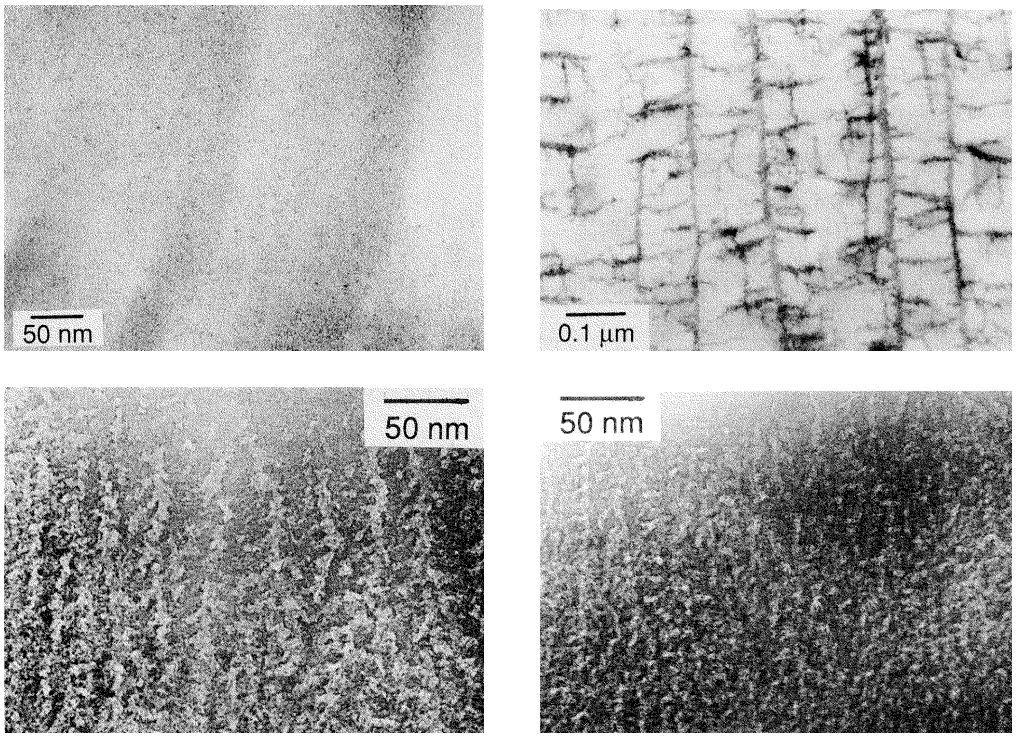
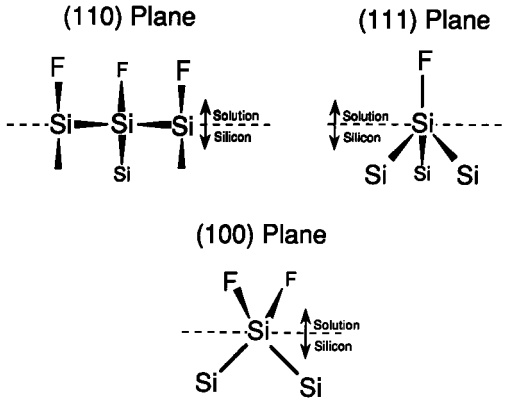
Light-Emitting Porous Silicon – a STM Study

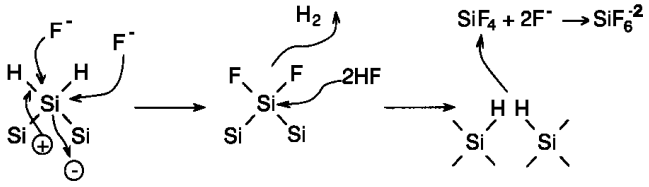
- Quantum confinement – STM proof
- STM-induced electroluminescence
- STM nano-structuring



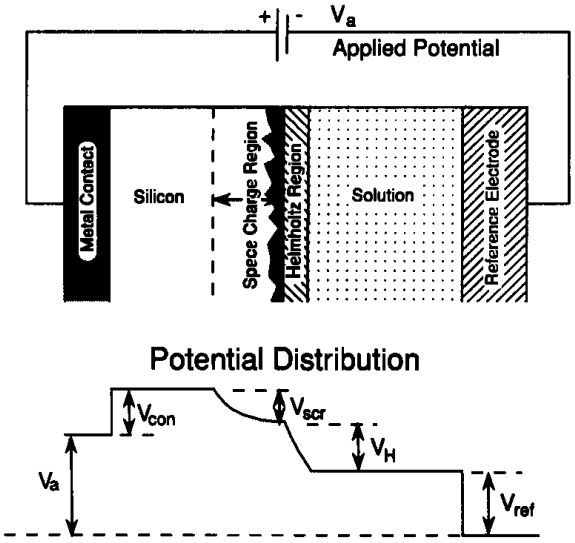
XTEM Micrographs Showing the Basic Differences in the Morphology Among *p*, *n*, n^+, and p^+ Porous Silicon. [Chuang 1989]



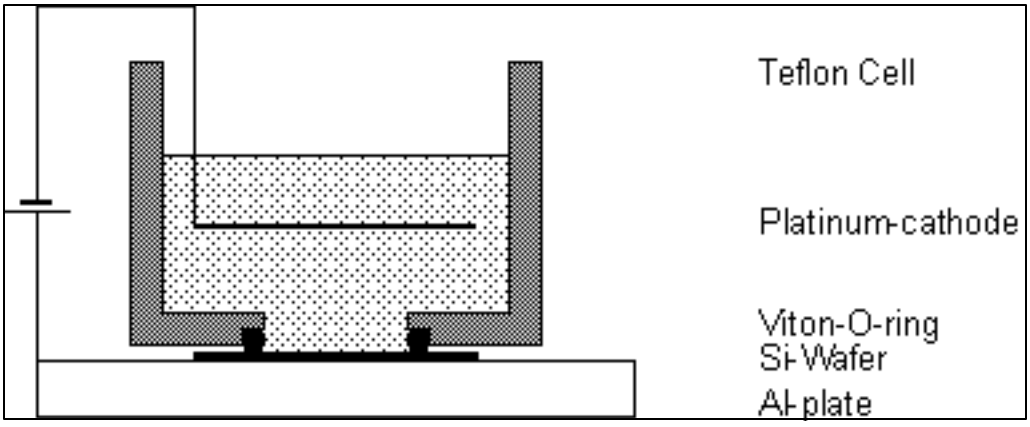
Schematic Drawing of Bond Orientation for Three Common Crystalline Planes: (110), (111), (100)



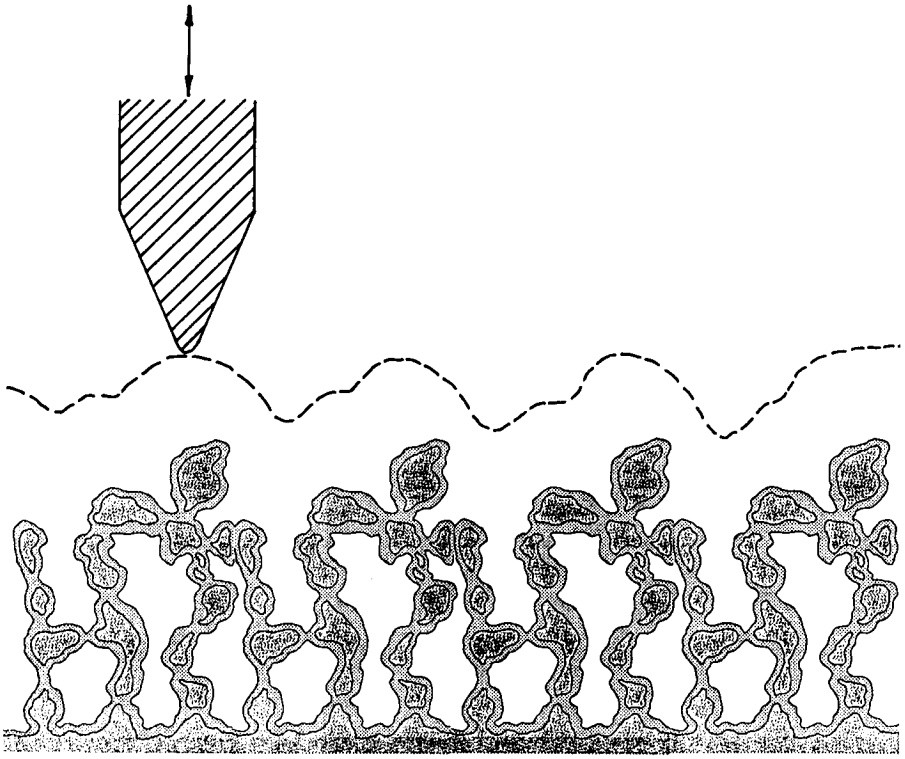
Si Surface Bound Oxidation Scheme. [Lehman 1991]



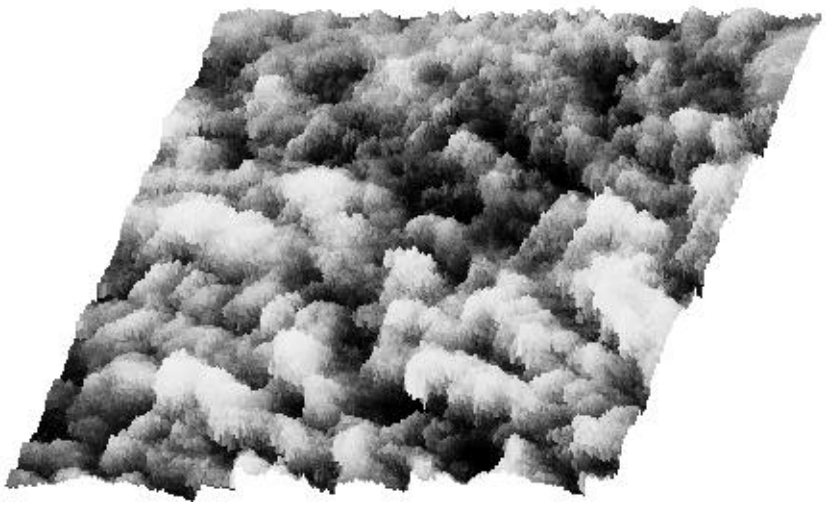
Schematic of the Si/Solution Anodization Circuit Showing the Potential Drops Across the Various Interfaces.



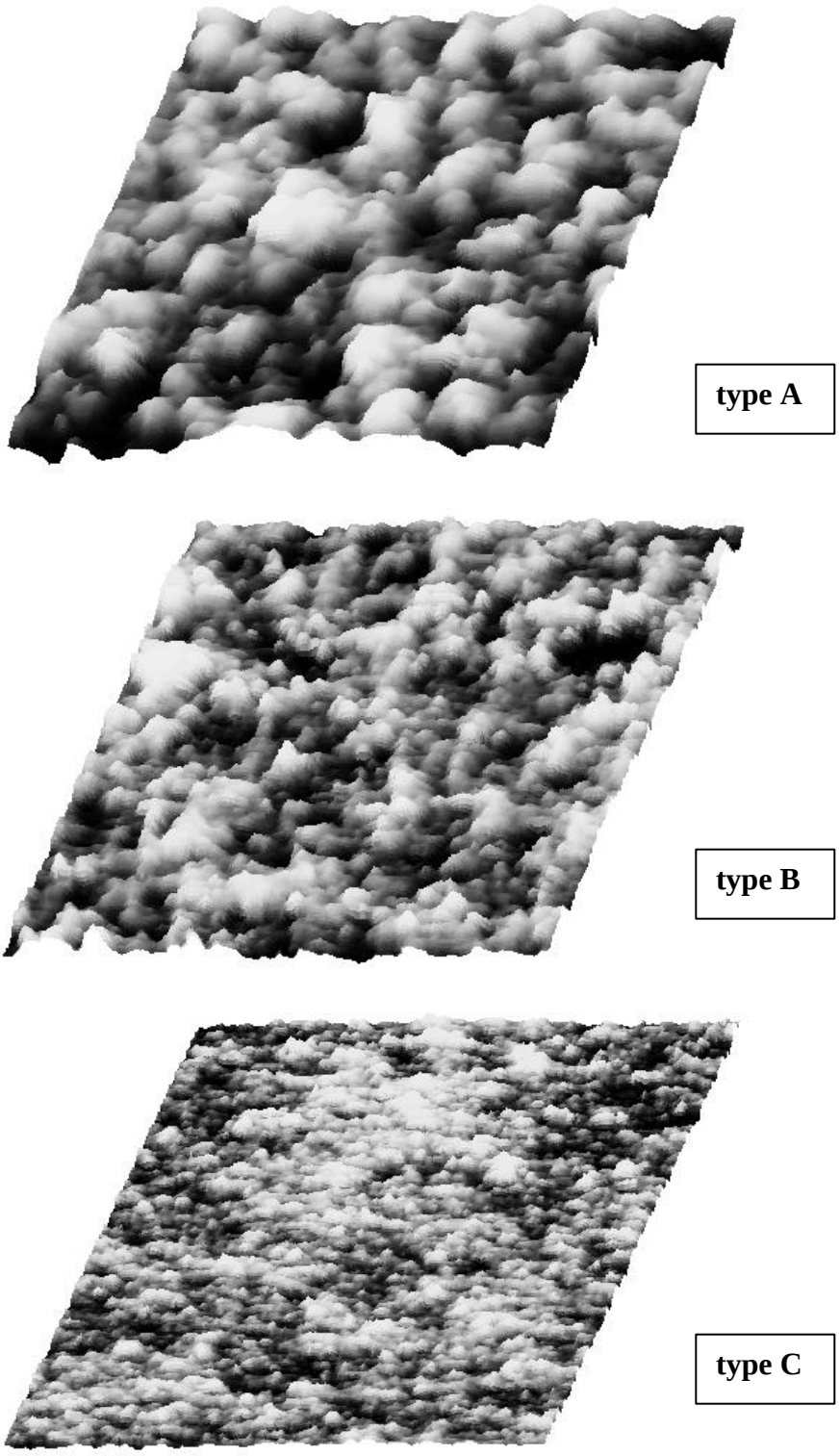
Schematic of the Electrochemical Anodization Cell Used for Porous Silicon Preparation.



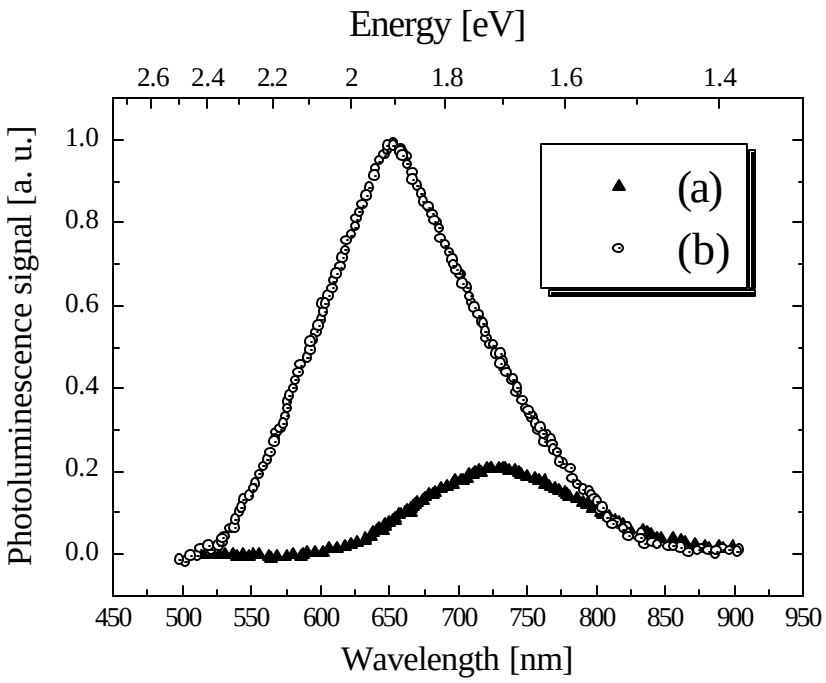
Schematic Representation of the Convolution Effect Between the Porous Silicon Topography and the STM Tip. (not to scale)



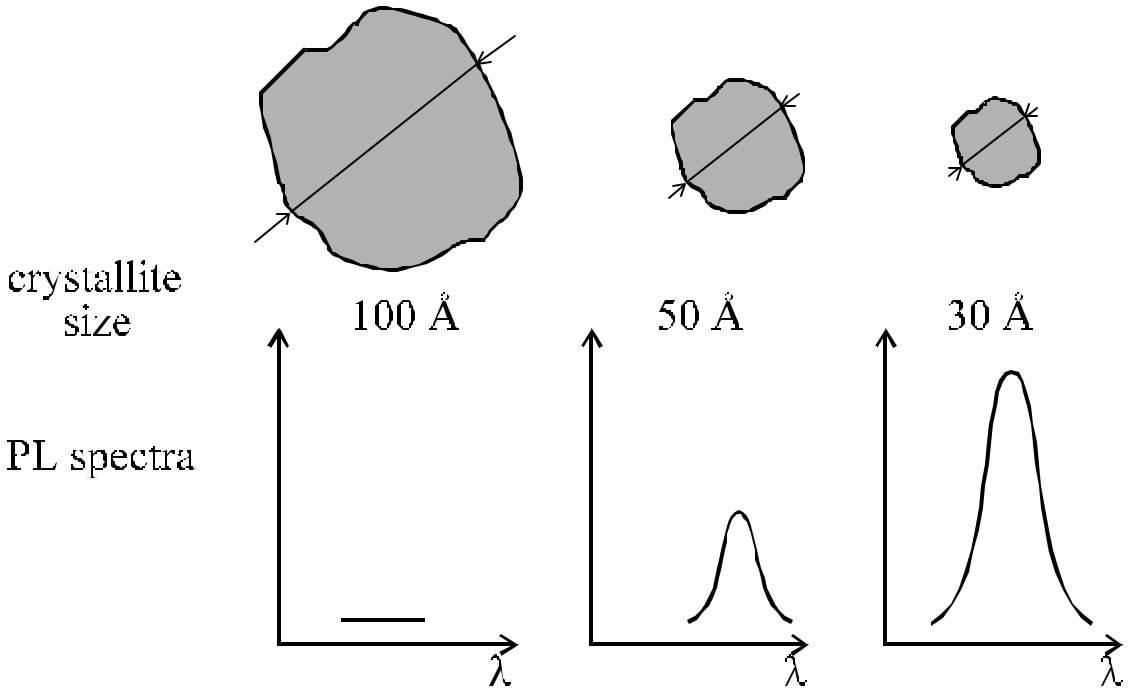
3-D STM Image of Porous Silicon Surface. (980nm x 900nm)



3-D STM images of a 20-nm-thick Porous Silicon Film. Observe the Morphological Features Size for: type-A (Exhibiting no Visible Photoluminescence), type-B (Exhibiting Weak Visible Photoluminescence), and type-C (Exhibiting Efficient Visible Photoluminescence) Films. STM Images Size: 110nm x 110nm.

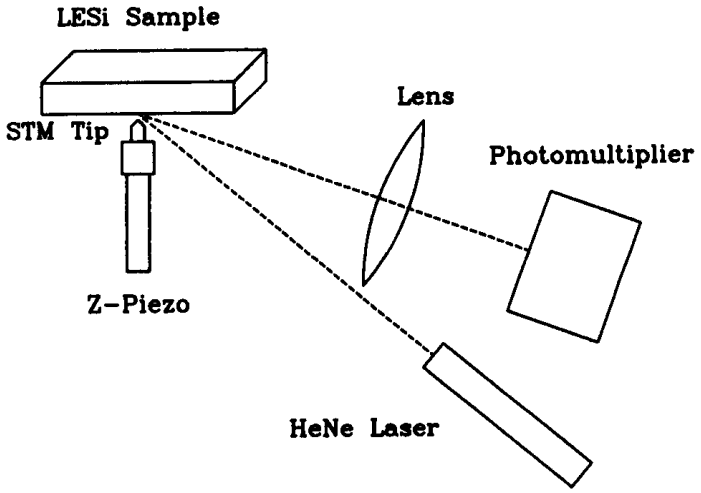


Photoluminescence Spectra of type-B(a) and type-C(b) Porous Films.

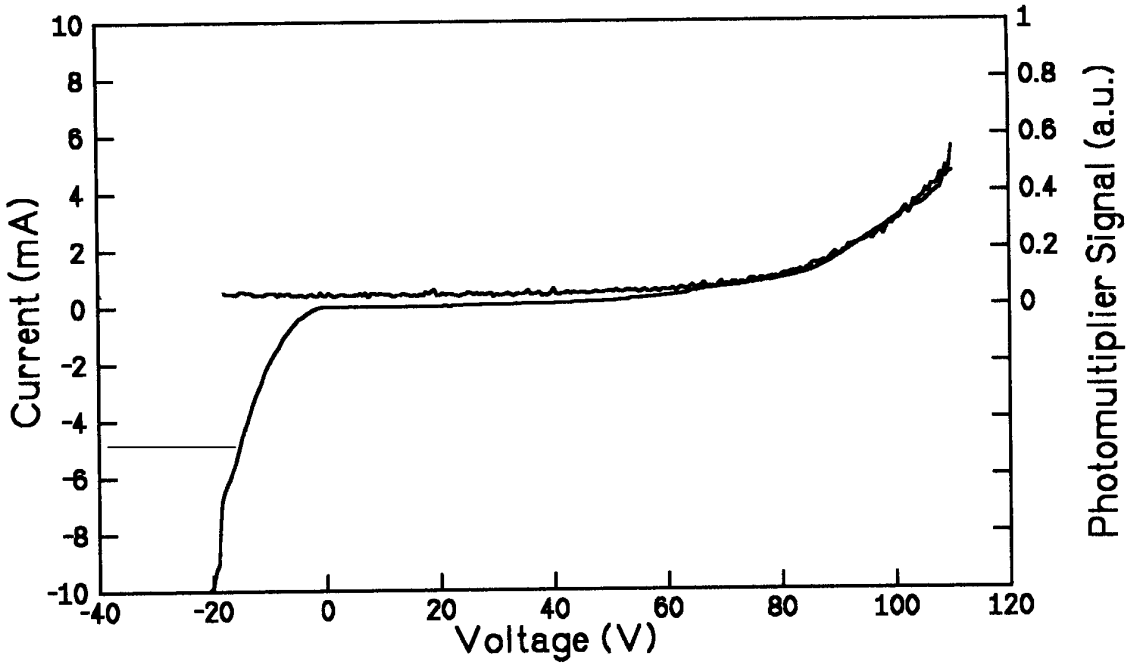


rms roughness	6.8 Å	4.5 Å	2.8 Å
corrugation amplitude	60 Å	40 Å	20 Å

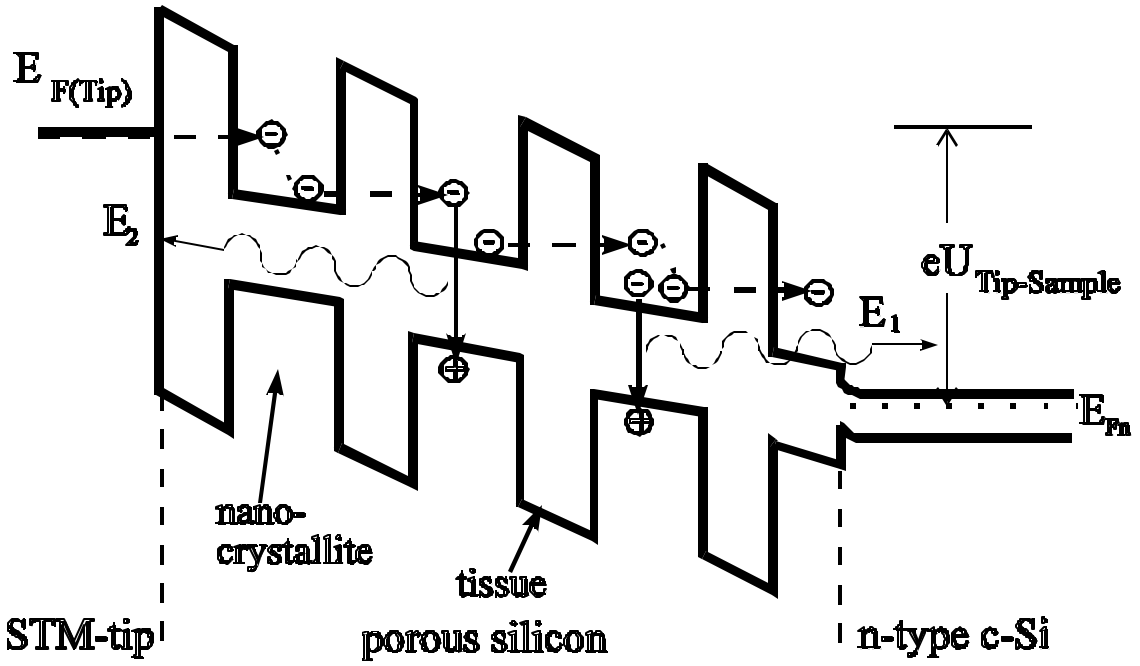
Symbolic Presentation of the Correlation Between Evolution of Surface Morphology and Evolution of Photoluminescence Signal.



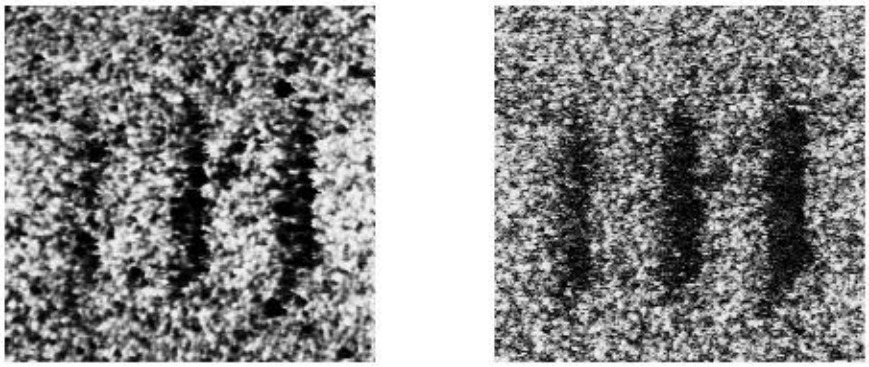
Schematic Drawing of the STM-Induced Electroluminescence Experiments.



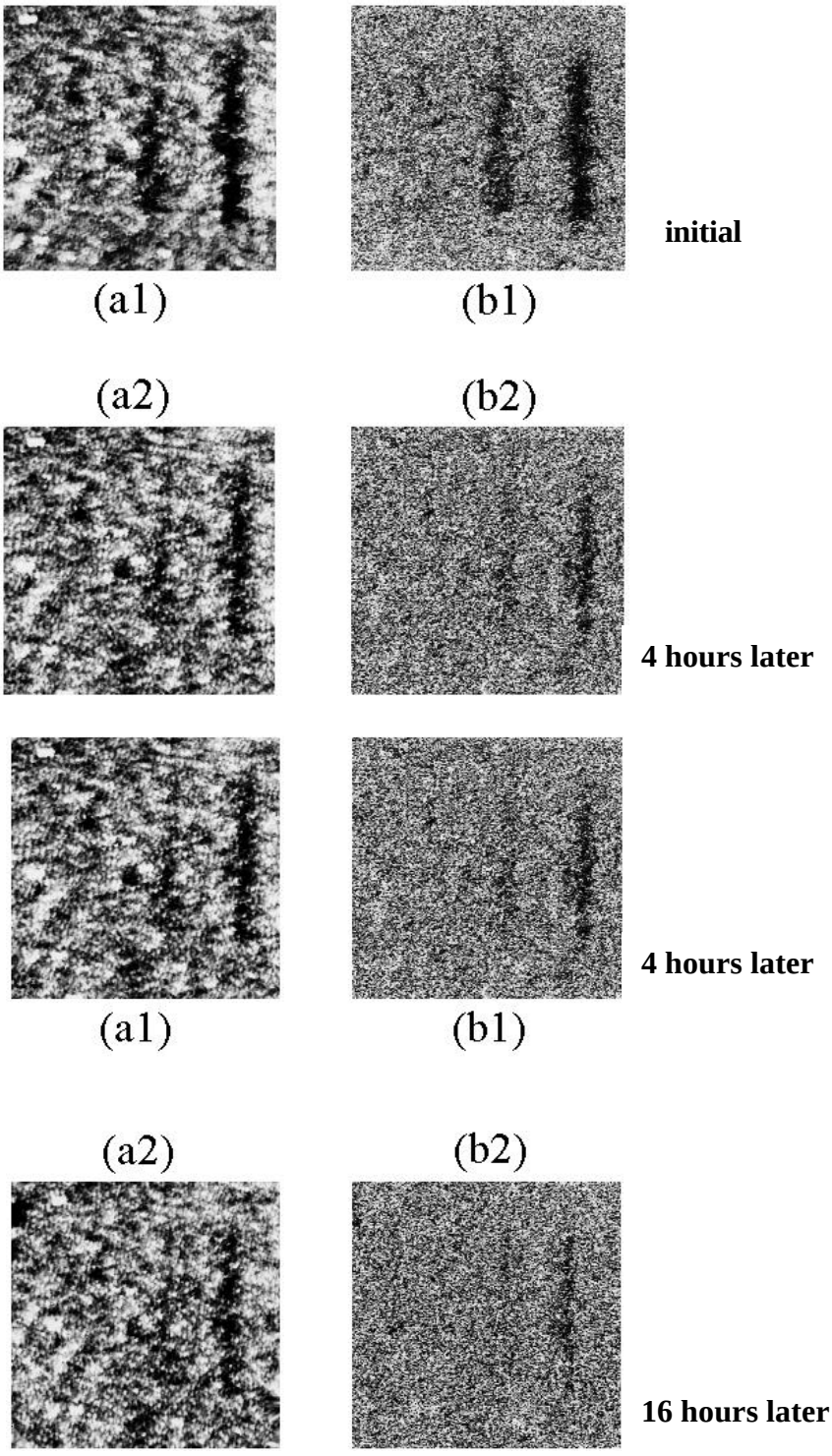
Current-Voltage Characteristic and the Simultaneously Recorded STM-Induced Electroluminescence.



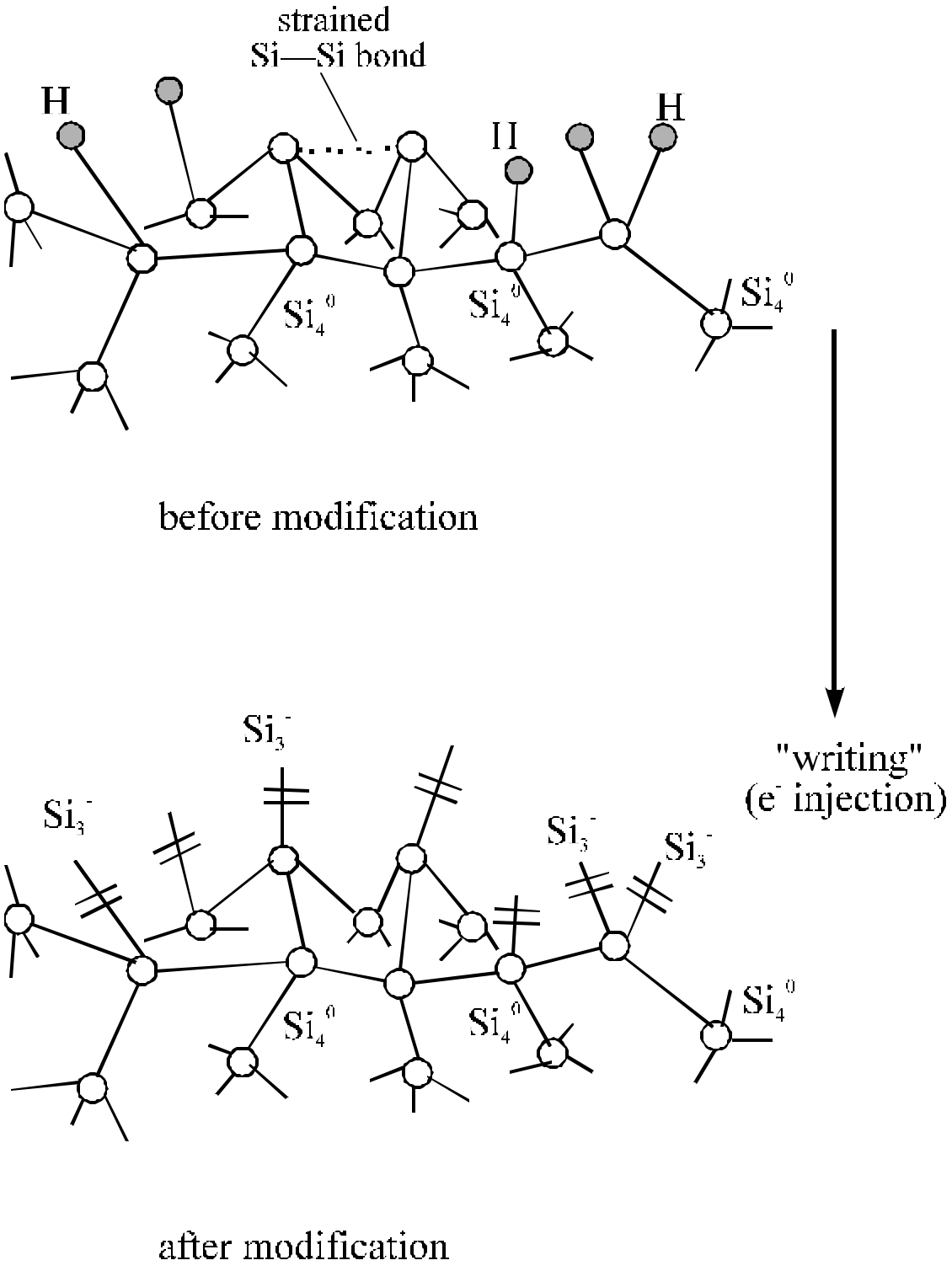
Energy Band Diagram Explaining the Origin of the STM-Induced Electroluminescence.



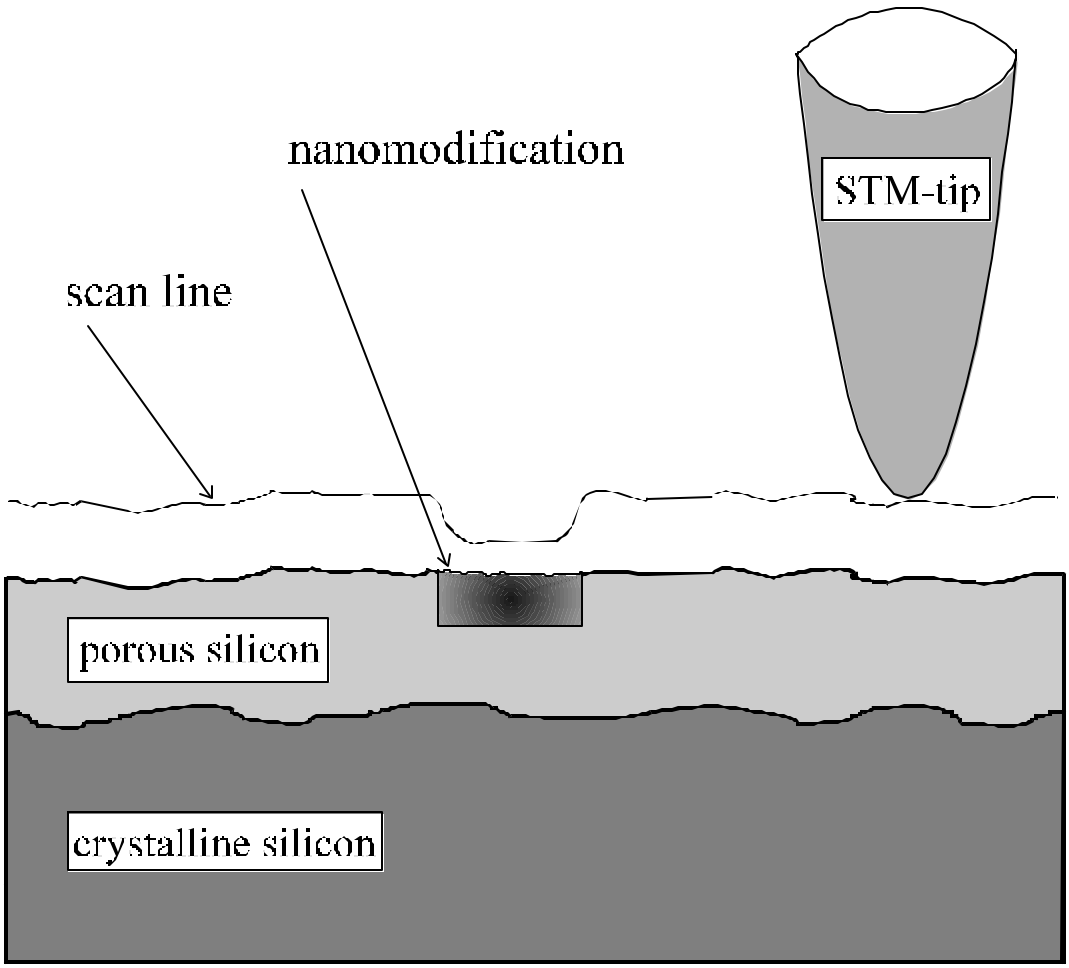
STM "Writing" Nano-Structures onto Porous Silicon. (500nm x 500nm)
(simultaneously topography and tunneling barrier height)



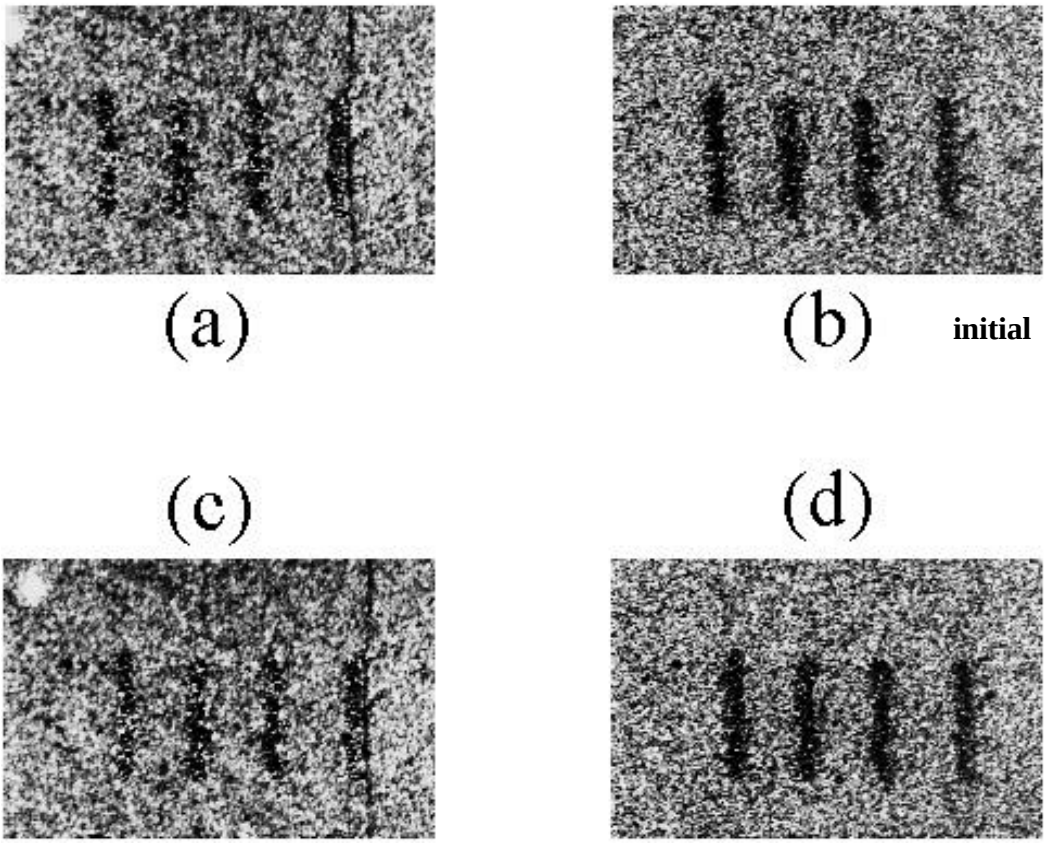
Relaxation Behavior of the STM "Written" Nano-Structures. (550nm x 550nm)
(simultaneously topography and tunneling barrier height)



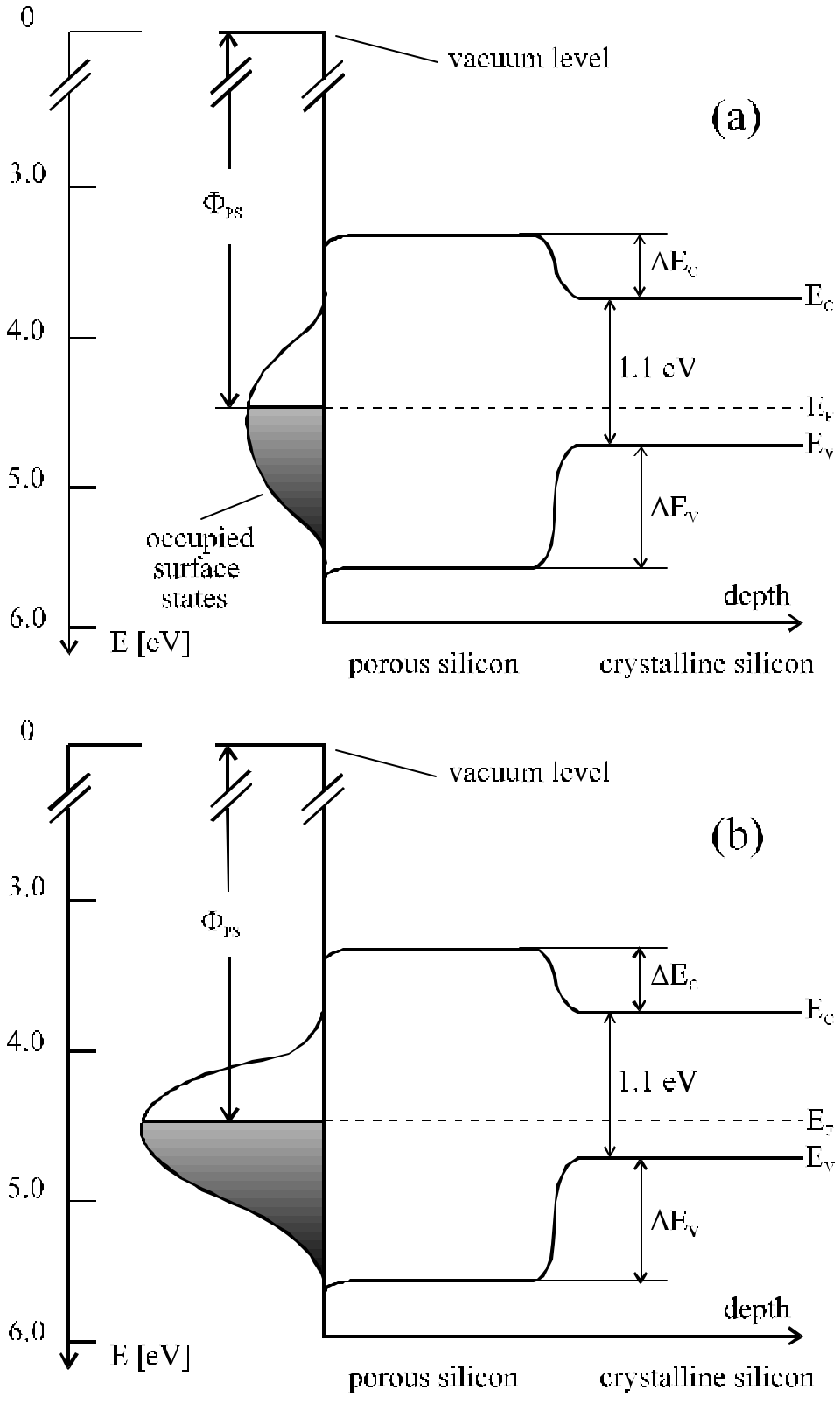
Microscopic Model for Electronically Induced Modifications
by STM Tip onto Porous Silicon.



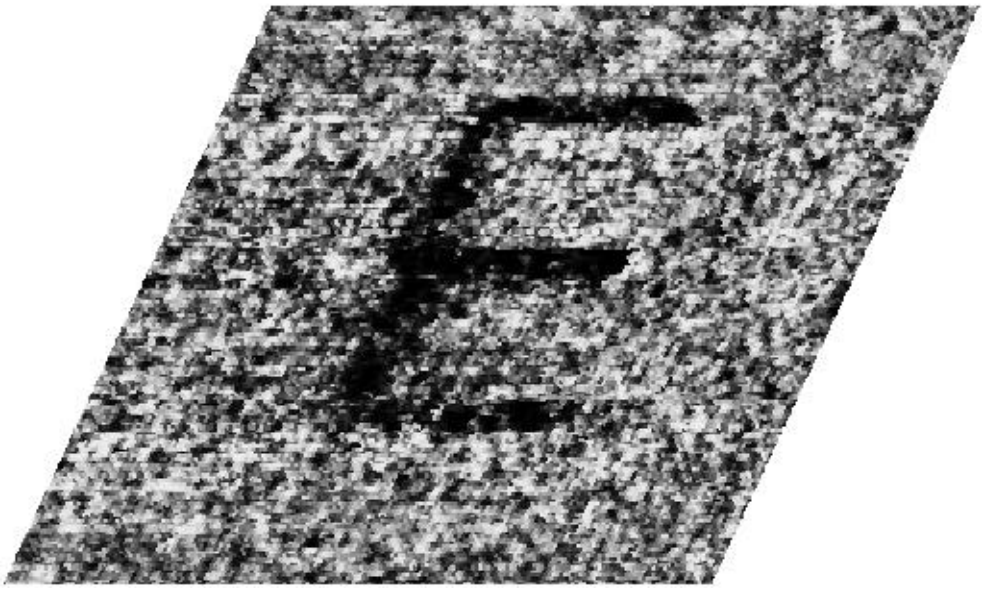
Schematic Drawing of the STM Tip Scanning Across a Porous Silicon Modified Region.



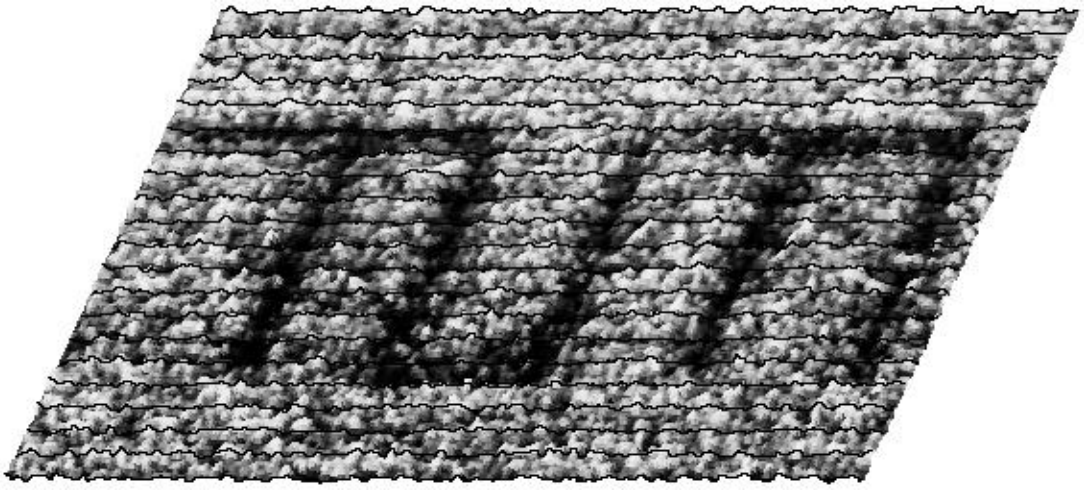
STM "Writing" of Stable Nano-Structures onto Porous Silicon. (880nm x 550nm)
(simultaneously topography and tunneling barrier height)



Band Structure Model Representing the Porous Silicon Film and the Crystalline Silicon, Including the Surface States before(a) and after(b) STM "Writing".



"Writing" a Letter by STM onto 20-nm-thick Porous Silicon. (500nm x 500nm)



"Writing" by STM the Logo of Technical University of Munich ("TUM") onto 20-nm-thick onto Porous Silicon. (900nm x 500nm)